

Process Specification for the Installation of Helical Coil Inserts

Engineering Directorate

Structural Engineering Division

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Process Specification for Installation of Helical Coil Inserts

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REVISIONS		
VERSION	CHANGES	DATE
Baseline	Original version	4/19/99
A	Changed Division name. Added information and requirements for specifying thread class in Usage section, and added verification requirement for proper class of tap to Process Verification section. Moved threadform verification requirement from Process Requirements to Process Verification Section. Moved Work Instructions from section 3.1 to section 6.1 and revised them, restructured section 6.	10/2004
B	Updated document numbers in Section 4.0 (References)	2/2007
C	Clarified the effect of fit on insert performance, made changes in the usage section, including a table for standard insert part numbers, added specification for metric insert installation, added requirements on hole countersinking and tang removal, and tightened up the verification requirements,	11/17/2010

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1.0 SCOPE

This process specification establishes the engineering requirements for the installation of helical coil inserts.

2.0 APPLICABILITY

This specification shall be applicable whenever the installation of helical coil inserts is invoked per section 3.0, "Usage".

3.0 USAGE

3.1 BACKGROUND:

Helical coil inserts are made from a coil of wire with a diamond shaped cross section, which forms both internal and external threads. The inserts have a tang that is used to install the insert into tapped holes. After installation the tang is typically broken off and removed to allow the insert to accommodate threaded fasteners.

In their free state, helical coil inserts are larger than the tapped hole into which they are installed. During assembly, torque applied to the tang reduces the diameter of the first coil so that it can enter the tapped hole. The subsequent coils are reduced in diameter as they are screwed into the tapped hole. When the applied torque is removed, the coils expand to provide an interference fit with the tapped threads.

Holes for helical coil inserts are tapped with a special tap known as a Screw Thread Insert (STI) tap. Helical coil STI taps are available in both Class 2B and Class 3B fits. The class of fit of the tapped hole determines the class of fit of the assembled insert. Class 2B threads provide the maximum production tolerances and reduce galling and interference, but may result in lower running torques for locking inserts. Class 3B threads may result in higher or more consistent running torques for locking inserts. There is only one class of fit for metric series inserts.

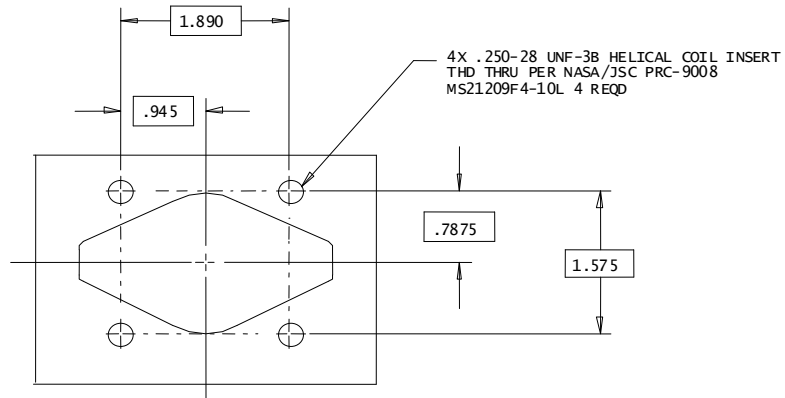
3.2 USAGE INSTRUCTIONS:

Wet installation of inserts with corrosion preventative primer is standard for aluminum and dissimilar metal joints. However, in some design cases, (for example, very small helical coil inserts) the use of primer may not be recommended. The decision not to use sealant should be reviewed in advance with an ES Materials Engineer .

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This process specification, insert part number, and thread class for helical coil inserts shall be specified on the engineering drawing using local notes, general notes, flag notes, or a combination thereof. Some examples of acceptable insert callouts are given in Figure 1 and Figure 2. These figures are guidelines and are not intended to be representative of every possible design concept.

Field of Drawing



General Notes

4. INSTALL HELICAL COIL INSERTS PER NASA/JSC PRC-9008.
SEAL WITH SUPER KOROPON EPOXY PRIMER PER NASA/JSC PRC-4004.

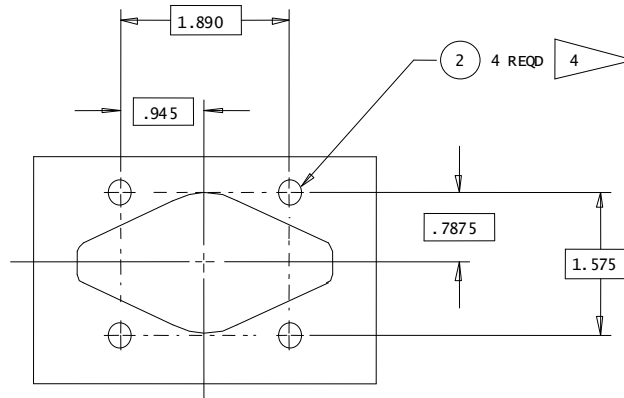
Parts List

AR	515-700/910-704	SUPER KOROPON EPOXY PRIMER		3	3
4	MS21209F4-10L	INSERT			2
1	-001	BRACKET	7075-T7351 AL ALLOY 6.00 X 5.75 X 3.75	AMS-QQ-A-250/12	1
-301	SEK51346106	BRACKET ASSY			
QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM

Figure 1: Specification of Insert Thread Class Using a Local Note

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Field of Drawing



Flag Notes

4 4X .250-28 UNF-3B HELICAL COIL INSERT THREAD THRU PER NASA/JSC-9008
INSTALL INSERTS PER NASA/JSC PRC-9008. SEAL WITH SUPER KOROPON EPOXY
PRIMER PER NASA/JSC PRC-4004.

Parts List

AR	515-700/910-704	SUPER KOROPON EPOXY PRIMER		3	3
4	MS21209R4-10L	INSERT			2
1	-001	BRACKET	7075-T7351 AL ALLOY 6.00 X 5.75 X 3.75	AMS-QQ-A-250/12	1
-301	SEK51346L06	BRACKET ASSY			
QTY	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	ITEM

Figure 2: Specification of Thread Class Using a Flag Note

Since tang removal after installation is required by this specification, it is unnecessary to specify the removal of tangs on the engineering drawing.

The standard installation is countersunk as specified in NASM33537 or MA1567. The countersink also affects the depth the insert should be set below the surface. If a different (or no) countersink is required, it must be noted on the engineering drawing, along with the new insert depth.

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The standard insert part numbers used at JSC are:

	Inch Series	Metric Series
Locking	NASM21209	MA3329 MA3330
Free-Running	NASM122076-122115 NASM122116-122155 NASM122156-122195 NASM122196-122235 NASM122236-122275 NASM124651-124690 NASM124691-124730 NASM124731-124770 NASM124771-124810 NASM124811-124850	MA3279 MA3280

4.0 **REFERENCES**

All documents listed are assumed to be the current revision unless a specific revision is listed.

JPR 8500.4	<i>Engineering Drawing System Manual</i>
NASM8846	<i>Inserts, Screw Thread, Helical Coil</i>
NASM33537	<i>Insert, Screw Thread, Helical Coil, Inch Series, Coarse and Fine Thread, Standard Assembly Dimensions for</i>
MA1567	<i>Insert, Screw Thread, Helical Coil Metric Series, Standard Assembly Dimensions For</i>

5.0 **MATERIAL REQUIREMENTS**

None identified.

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6.0 PROCESS REQUIREMENTS

6.1 WORK INSTRUCTIONS

All work procedures shall be performed to written procedures.

For work performed at JSC facilities, these work procedures shall consist of Detailed Process Instructions (DPI's).

For contracted work, the contractor shall be responsible for preparing and maintaining, and certifying written work procedures that meet the requirements of this specification.

6.2 GENERAL REQUIREMENTS

Hole preparation, installation and removal shall meet the requirements of NASM33537 and MA1567.

The holes shall be countersunk to the standard dimensions unless specifically called out on the engineering drawing.

Tangs shall be removed unless the engineering drawing specifically requires otherwise.

7.0 PROCESS QUALIFICATION

The helical coil insert installation process shall be qualified and accepted prior to assembly of production parts. This qualification shall provide documented evidence that the installation procedures are capable of meeting the requirements of this process specification and the engineering drawing. Any change to the procedure, tools, or insert type shall require requalification.

8.0 PROCESS VERIFICATION

Process verification shall be performed according to the requirements of NASM33537 or MA1567. In-process verification is required to assure that the correct STI tap is used (2B or 3B). The minor diameter, countersink, and threadform of the holes shall be verified prior to installation of helical coil inserts. Post-process verification of insert depth and tang count is required.

9.0 TRAINING AND CERTIFICATION OF PERSONNEL

This process shall be performed by personnel qualified through training or experience and certified by their supervision to conduct the process.

10.0 DEFINITIONS

None.